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PHONOGRAPH RECORD CHANGER

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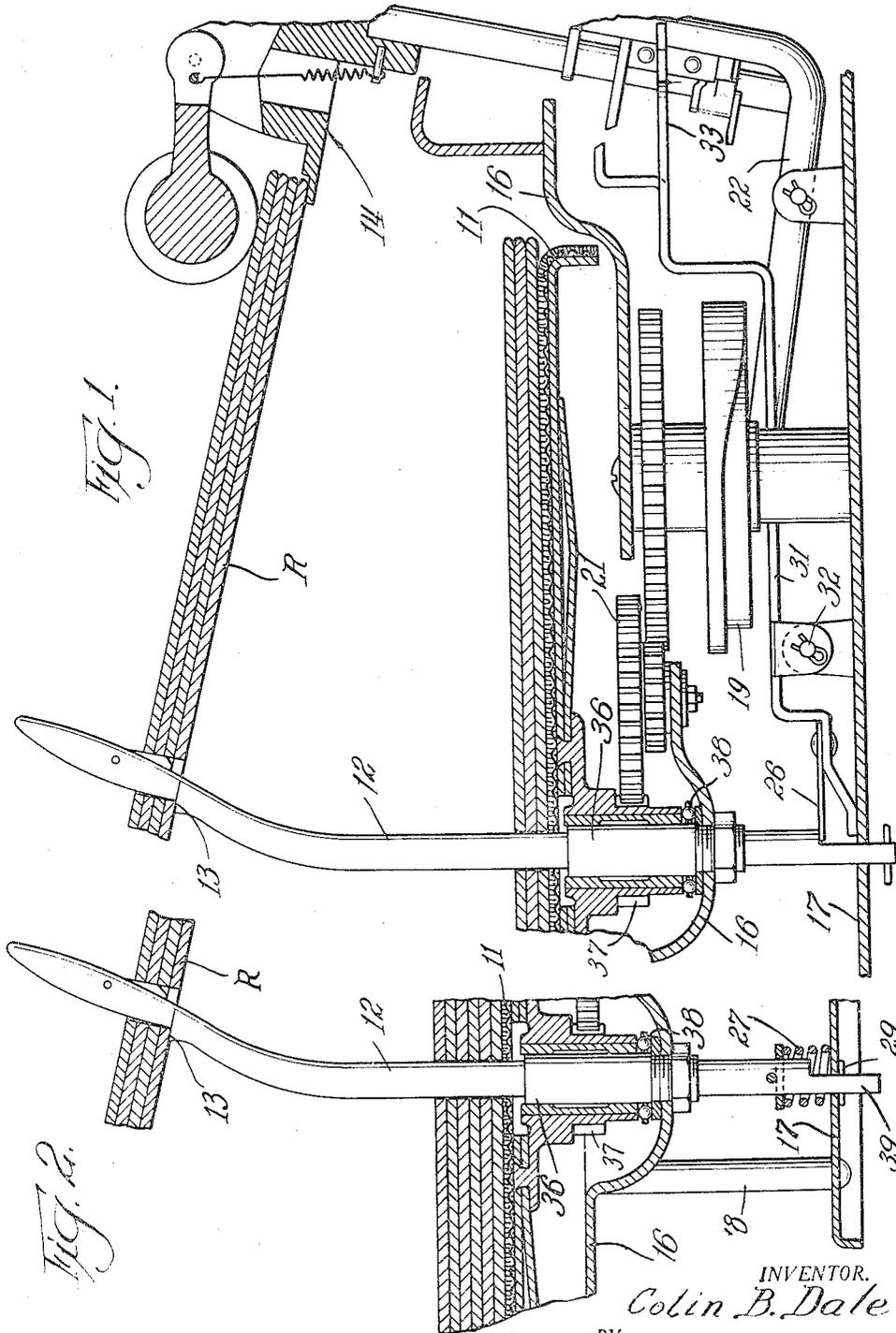


FIG. 1.

FIG. 2.

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PHONOGRAPH RECORD CHANGER

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1 Claim. (Cl. 274—10)

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In one type of automatic record-changing phonograph, the records to be played are slipped onto a central spindle of the phonograph which is provided with a shelf at a considerable height above the turntable. The records to be played rest on this shelf, the successive bottom records being pushed off of the shelf one at a time to drop to the turntable where they are played. The push-off is accomplished by a push-off device which engages the record at one edge thereof. Since this is the only part of the record-dropping mechanism which needs to be controlled by the cycling cam, this type is much simpler than the multiple post type in which the record is supported at spaced points around its edge and dropped by simultaneous movement of the supporting means at the spaced points.

The simplicity of the shelved spindle type of record-changer has long been recognized, but there has been considerable objection to its use because of the fact that some damage to the records around the hole has resulted, and records could be played on this type of player only a limited number of times.

According to the present invention, this damage to the records around the hole in each has been virtually eliminated. Applicant has determined that the damage results from the impact of the records as they drop onto the shelf after the bottom record has been pushed off of the shelf. It may be surprising that the records acquire enough speed in the course of dropping merely the thickness of one record to be damaged by this impact. Perhaps it has been generally assumed that the damage resulted to the records being pushed off as they scraped over the corner of the shelf. The present invention disproves any such supposition, however, because tests have proven that the reduction of the impact resulting from the use of the present invention substantially eliminates the breakdown around the holes.

According to the present invention, the impact is reduced below the critical value causing damage by providing some resiliency for the shelf, so that as the records come down upon the shelf, they are stopped more gently than with a rigid shelf. This resiliency is most easily provided by a resilient mounting for the spindle.

Additional objects and advantages of the invention will be apparent from the following description in which

Fig. 1 is a fragmentary, sectional view of a portion of the phonograph illustrating the present invention.

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Fig. 2 is a similar view showing a modified form of the invention.

In the illustrated form of the invention, the phonograph may include a turntable 11, a spindle 12 having a shelf 13 thereon, and a push-off device 14. All of these parts may be carried by the frame which may comprise a main base 16 and a bottom plate 17 rigidly secured thereto, but spaced therefrom, as by posts 18, one of which is shown in Fig. 2.

The records to be played rest on the shelf 13 of the spindle 12, the bottom record being pushed therefrom by the push-off device 14. Although the manner of operating the push-off device is not important to the present invention, it may be noted that a cam 19 is driven through gears 21 in conjunction with the turntable 11, and this cam operates a bell crank lever 22 carrying the push-off device 14, or forming a part thereof.

When the bottom record R is pushed off of the shelf 13, the records above it drop freely to the shelf 13. Although they do not acquire much speed during this short drop, a rigid spindle would tend to stop them very suddenly and, therefore, with a severe impact. To illustrate how severe the impact may be, it is noted that if the theoretical stopping time of zero were ever reached, the impact would be infinitely great, no matter how slow the movement. Of course this theoretical condition is never reached, but with a nominally rigid spindle, the duration of the stopping of the record is so extremely short that a high impact value is reached.

According to the present invention, the shelf 13 is provided with some resiliency to cushion this impact, or in other words to allow more time for the stopping of the records as they drop on the shelf 13. Some resiliency could be incorporated in the spindle in the neighborhood of the shelf 13, but it has been found adequate to provide a resilient mounting for the spindle. Thus in Fig. 1, a leaf spring 26 has been provided and in Fig. 2, a coil spring 27 has been provided. In each instance, the cushioning function is substantially the same, the spindle 12 shifting downwardly under the force of the impact and flexing the supporting spindle 26 or 27.

It has been found that a fairly stiff spring may be used inasmuch as a small displacement of the spindle is enough to very greatly reduce the impact. Thus if a nominally rigid spindle would yield a thousandth of an inch, it would follow that a spring 26 so stiff as to permit the spindle to be displaced only one hundredth of an inch might, nevertheless, reduce the impact to one

tenth of its previous value. It is desirable to use a fairly stiff spring so that the spindle will not be displaced very far, nor the records moved very far from their ideal position in which the bottom record R is parallel with the shelf 13. As a matter of fact, in Fig. 2, the spring 27 may be a loaded spring i. e. a cotter pin 29 may be so positioned to limit the upward movement of spindle 12 so that the spring 27 will remain under substantial compression. This compression is preferably at least enough to support the maximum load of unplayed records for which the phonograph is designed, so that the spindle 12 will be in the position shown at all times except when it is momentarily displaced by an impact.

In Fig. 1, this provision of a loaded spring is dispensed with in order to make use of a scale lever 31 which is pivotally mounted by a pin 32 so that when no records are resting on the spindle shelf 13, the outer end 33 of the scale lever will drop. This shift may be used to control suitable mechanism for stopping the phonograph after the last record has been played, but the manner in which the shut-off is accomplished is not important to the present invention and hence need not be described.

It is interesting to note spring 26 may be so stiff that its flexing with the weight of the records is hardly visible, perhaps being on the order of a thirty-second of an inch, although still furnishing adequate cushioning for the impact when the records are dropped on the shelf 13.

In order that the spindle 12 may be displaced freely, or without binding, it is preferably guided at widely spaced points. Thus at the bottom, it fits fairly snugly in a hole provided in the bottom plate 17, and it is also provided with a reasonably snug fit with the main base 16 or a bushing 36 extending upwardly from the main base 16. The bushing 36 also serves as the bearing for the pinion and turntable carrying member 37, the end thrust of which is preferably received by a ball-bearing assembly 38. By supporting the turntable and its carrying member 37 independently of the spindle 12, the latter is freed

from the load thereof so that the spring 26 or 27 need only support the spindle 12 and the records to be played.

It will be observed that the extension 39 of the spindle is semi-circular in cross-section and passes through a similarly shaped hole, so as to ensure the proper rotative positioning of the spindle 12.

From the foregoing, it is seen that a phonograph is provided in which the records are dropped by a very simple mechanism of the shelved spindle type and yet damage or breakdown of the holes in the records is substantially eliminated.

I claim:

Record-changing apparatus including a frame, an upright spindle slidably carried by the frame and adapted to have slipped on it records to be played, said spindle being provided with a shelf arranged to support a stack of records in a horizontal position, and resilient means supporting the spindle and urging said spindle in an upward direction and permitting the spindle to be downwardly displaced to cushion the impact of the records against the shelf when the records are dropped thereon after displacement of the bottom record of the stack from said shelf, said resilient means being sufficiently stiff to support the spindle approximately in a predetermined position with any variation of load of records from one to the maximum for which the record-changer is designed.

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